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with appendix

APPENDIX

TO THE

ANATOMY OF THE BRAIN,

CONTAINING

A PAPER READ BEFORE THE ROYAL SOCIETY
ON THE 14TH OF MAY, 1829,

AND SOME REMARKS ON MR. CHARLES BELL'S
ANIMADVERSIONS ON PHRENOLOGY.

WITH SEVEN LITHOGRAPHIC PLATES.

BY

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PREFACE.

RICHARD CHENEVIX, Esq., who died too soon for science and friendship, during his last stay in England, desired me to give him a Paper on any point of Phrenology, proper to be presented to the Royal Society of London. I complied with his wish, in order to try the wisdom of that learned body, and my lamented friend delivered the following Paper to one of the Secretaries, who read it to the Society on the 14th of May, 1829, but declared that it could not be printed in the Transactions of the Society, because it did not contain any new matter. I grant that its general principle—the plurality of organs—prevails in the joint publications of Dr. Gall and myself, as well as in my work on the Anatomy of the Brain; but the specifications of the particular cerebral portions, 1st, in the ordinary state of the Human Brain—2dly, in the Brain of an Idiot—3dly, in the Brain of the Ourang-outang, cannot be found in our works, since Dr. Gall died without knowing those points, and I did not know them when I published my work on the Anatomy of the Brain, in 1825. My former manner of marking the organs on the external surface of the head (see the Phrenological Busts), compared with the new delineation, is an evident proof of this truth: formerly I indicated the situation of all, but the limits only of a few

organs, whilst the actual delineation corresponds not only with the situation of the organs, but also with their limits and configuration. This additional discovery was desirable—nay, indispensable—to our other anatomical discoveries and publications in connexion with the Physiology and Pathology of the Brain.

On the other hand, the Transactions of the Royal Society contain many new illustrations of known principles, whilst none of their volumes give the views contained in my Paper on the Brain in the ordinary state, in the state of Idiotism, and on the Brain of the Ourang-outang. It is, however, conceivable that the Secretary, who never ceased to be hostile to Phrenology, found, as he said, that my ideas require a great imagination to be admitted, and objected to their being printed in the Philosophical Transactions. My friend Chenevix, in order not to have a formal refusal, withdrew the Paper. The adversaries of Phrenology may not appreciate, perhaps not even understand, the principles and ideas of my Paper; but those who take interest in the most important part of Anthropology will appreciate them, as the completion of the Phrenological Anatomy of the Brain. I publish the Paper without the least alteration. I profit of this opportunity to make a few remarks on Mr. Charles Bell's animadversions on Phrenology, and rely throughout on truth and on the justice of public judgment.

G. SPURZHEIM.

APPENDIX,

ETC. ETC.

On the Brain as an Aggregation of Parts.

THE slow progress of human understanding is perceptible in all branches of knowledge, but it is particularly striking in the doctrine of the nervous system. It is not yet long ago that, however strange it may appear, the brain was classed along with the viscera of the abdomen and thorax, and its structure treated of in the *Splanchnologia*, though at the same time it was considered as the origin of the nerves of the whole body. The old error, too, that the nervous system is composed of similar parts and can be compared with a net, prevailed till lately, though it may be refuted by anatomical, physiological and pathological facts, and though several ancient anatomists, particularly Erasistratus and Galenus, had already perceived the light of truth. It, however, was reserved to modern anatomists to establish sounder notions of the structure and functions of the nervous system in general, and of the brain in particular.

The brain and the nervous apparatus are now placed together in one system. Proofs, founded on comparative and human anatomy, are quoted to show that the nervous masses are different, and that the brain, spinal cord, and nerves of the vegetative functions, cannot be confounded with each other. Not only divisions, but even subdivisions of the individual portions, are admitted. Winslow, Johnstone, and Bichat not only separated the great sympathetic from the spinal cord and brain, but considered it also as an aggregation of nerves, or as a suite of communications between different nervous centres, situated at various distances from each other, and destined to separate functions. The physiological experiments of Mr. Charles Bell and of M. Magendie leave no doubt of the nerves of sensation and of voluntary motion being different. Mr. Charles Bell speaks of peculiar nerves of respiration, and of six sorts of nerves in the organ of sight. Three sorts of nerves go to the tongue, and the difference of the nerves of the five external senses is generally known. Thus, the difference and necessary subdivision of the nerves of the thorax and abdomen, of the spinal cord and of the external senses, is admitted; but the error, to consider the brain as a unity, is still pretty common, though it also may be refuted by anatomical, physiological and pathological facts, and though it has already been pointed out by several intelligent authors. In order to bring the doctrine of the brain in harmony with the rest of

the nervous system, the following remarks are proposed for consideration; and this object being the foundation of the most important part of Anthropology, deserves the attention not only of the medical profession, but of all thinking classes.

I cannot help beginning my remarks with stating the singular fact, that many physicians, and even some anatomists, who believe in the plurality of the nervous apparatuses adapted to the various nervous functions of the body, continue to contend for the unity of the cerebral mass. However, the plurality of the nervous apparatuses of the abdomen, thorax, spine, and external senses, might invite them to think it probable that the brain too is an aggregation of parts, destined to different functions, and brought into communication with each other, particularly as the brain is simple in the lower animals, and marked by additions and amplifications of parts in proportion as the animal functions become complicated, till in the human brain we find parts of which animals are destitute, in the same way as the nervous apparatuses of the vegetative functions and external senses become numerous and complicated in proportion to the functions themselves.

The close examination of this object, in order to be satisfactory, is to be conducted with anatomical, physiological and pathological views, and by bringing these three sorts of observations into harmony. Anatomical investigations alone are not sufficient to show the difference of the nervous

masses, and they alone cannot be relied on. Physiology and pathology must be called upon, as better means of deciding the question. Anatomy alone, for instance, cannot decide which nerves are destined to sensation, and which to voluntary motion; but these two sorts of nerves are ascertained by physiology and pathology. The difference of the olfactory nerve, within the head, of fishes, birds, carnivorous and herbivorous animals, and monkeys, is so great, that without the external apparatus and without the function of this nerve being known, it would not be taken for the same nerve. Thus, whether the nerves in their appearance are similar or dissimilar in different animals, they are considered as similar, if their functions be such, and as dissimilar, if this be the case with their functions.

The brain has hitherto been treated, with respect to anatomy, physiology, and pathology, in a different way from the rest of the nervous system; and it has the same fate as to its comparative anatomy, and as to the plurality of its constituent parts. The human brain is taken as the type of comparison, and, in different animals, individual cerebral parts are admitted or denied according to their similar or dissimilar appearances of form, situation, and connexion. This proceeding, however, should not be relied on in the anatomy of the brain, any more than in that of the nervous system, and it will be changed as soon as the cerebral functions shall be known. In order not to

extend this Paper too much, I shall confine myself to mere anatomical points, which may prepare such physiological and pathological discussions as cannot be indifferent to those who delight in philosophical inquiries.

The human brain is divided into cerebellum and brain proper, and the brain proper is subdivided into two halves called hemispheres, and each hemisphere into three lobes—anterior, middle, and posterior. This division and subdivision may be admitted in birds and mammiferous animals. Some anatomists, however, refuse the posterior lobes to the greater number of mammiferous animals. Their reason is, because the cerebellum is not covered by the brain, as in man and monkeys. But this manner of judging is evidently erroneous, even from mere anatomical considerations. If the posterior lobes were wanting whenever the cerebellum is not covered by the brain, the anterior lobes might be said to be wanting also each time the bulb of the olfactory nerve is not covered by the brain in the way that it is in monkeys and in man. Various appearances in the nervous system are explained by the horizontal position of animals and the vertical station of man. The spinal nerves, for instance, of the mammiferous animals go off from the spinal cord in a horizontal direction, whilst in man they run from above downward before they pass through the dura mater. The medulla oblongata has a horizontal position in animals, and a vertical one in man.

The great occipital hole, too, has a different position in animals and man. Now, if these and various other modifications of appearance be accounted for by the different position of man and animals, shall this cause not extend its influence over the appearances of the cerebral parts? The eyes are not wanting in birds, and in the greater number of the mammiferous animals, because they are placed laterally in their heads, whilst in man and monkeys they are situated in the face: in the same way the posterior lobes may exist, though they lie before the cerebellum.

The internal structure of the posterior lobes furnishes a surer proof of their existence than their external appearance. In man, they are evidently composed of bundles which come from the pretended optic thalami. Now, these very ganglions exist in the mammiferous animals as well as in man, and bundles run out of them towards the posterior convolutions of the brain. This analogy of structure allows us to conclude upon similarity of parts, and this conclusion is put beyond doubt by observing instincts in animals which resemble certain feelings in man, the manifestations of which take place by the posterior lobes of his brain.

It is a difficult matter to decide about the existence or want of individual parts in the brains of man and animals. What is of the greatest importance is, not to confound the essence or existence of a special apparatus with its more or less complicated state, since a portion which

amplifies its structure may be wanting in certain animals, which, however, possess the apparatus of the special function, but in a more simple state. The intestinal canal, in different animals, is simple, or more or less complicated. Pigs, dogs, cats, etc., as well as the ruminantia, have a stomach, though in the former it is simple, and in the latter complicated. Birds, as well as mammiferous animals, have a cerebellum and hemispheres of brain; but the cerebellum of birds has no pons, and their hemispheres no corpus callosum. It was a great error to take the general type of brains in a class of animals as the criterion of the existence of individual parts. The corpus callosum, for instance, the pons, etc., have been taken as parts for themselves, whilst they are mere complications of individual cerebral apparatuses.

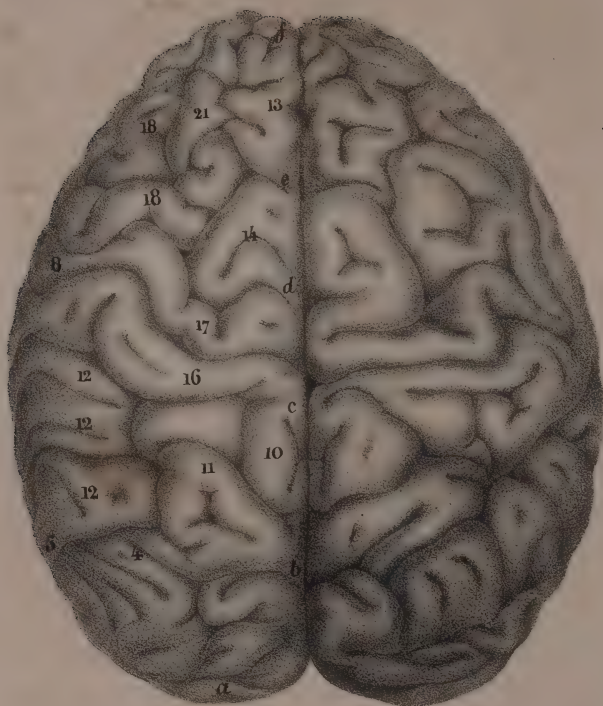
It is remarkable that the brains, though they are more or less complicated, preserve a common type in each class and in each genus of animals. In various animals, for instance, each portion of their brains is formed in a similar way, ends at the surface in one or several convolutions, and has fibres which run towards the middle line and contribute to make up what is called corpus callosum; but it was wrong to take the corpus callosum as a part for itself, whilst it contains merely portions of as many apparatuses as the hemispheres are composed of. The corpus callosum, then, is a mere indication that the special parts of the he-

mispheres of various animals are built according to a common type. But the general type of brains may be analogous, though the special apparatuses destined to individual functions may vary in number and size. Various brains may present three lobes, convolutions, a corpus callosum, a fornix with its appendices, four cavities, and yet the special parts which make up the whole of their brains may be different in number, size and quality, whilst their general form of structure alone is similar.

Thus, the old error in question committed by our contemporaries, as well as predecessors, must be abandoned, and the comparative anatomy of the brain must be treated as that of all other systems of organisation.

After these general remarks, I shall examine in particular—1st, Whether in the Human Brain individual parts destined to special functions may be pointed out, though they are in the most intimate connexion with each other—2dly, Whether it can be shown that in Brains of Idiots certain parts are defective or even wanting—and 3dly, Whether the Brain of the Ourang-outang and the human brain, which have the greatest analogy with each other, are composed of the same parts.

Pl.1.



I. *The Parts of the Human Brain in the ordinary state of health are essentially the same, and only modified in size and quality.*

Let it be kept in mind that a true division of the nervous system in general, and of the brain in particular, can be established only by the functions performed. The general form, direction, and connexion of the convolutions, however, prove the regularity of the essential parts of the human brain, and it is certain that individual portions may be pointed out.

This anatomical regularity is evident and particularly striking at the basis of the brain. The posterior convolution, for instance, of the basis of the anterior lobes is always transverse;—four cerebral portions meet at the external roots of the olfactory nerve; the convolutions in the middle line are longitudinal. A similar direction is perceptible in the convolutions of the middle lobe, etc.—As the appearance of the convolutions at the upper surface seems less regular, I give a drawing taken from a human brain, in order to exemplify my assertions, and to show the individual portions which may be seen in the ordinary state, whilst their modifications concern their size and their greater or smaller number of lateral indentations and depressions at the surface of the convolutions. These modifications exist not only in the brains of different persons, but on both sides of the same brain, as may be seen in the drawing before us (Pl. I.),

where the cerebral parts are reduced in size, but where proportions and configurations are preserved. Views of the brain from its basis and in profile are easily found in various anatomical publications.

The posterior extremity of the hemispheres is composed of several convolutions running in the direction towards the apex, *a*. Now, this portion between *a* and *b* is always distinct and separated from the following portion by a deep anfractuosity at *b*.

Between *b* and *c* is another portion, composed of several convolutions distinguishable in every ordinary brain. No anatomist, for instance, can be mistaken in looking for the convolution marked 10.

Between *c* and *d* lie always two convolutions, 16 and 17, which run laterally towards the cerebral portion 18, situated under the anterior inferior angle of the parietal bone. The convolution marked 16 was in this brain larger on the left than on the right side; but its lateral appearance, though modified on both sides, is essentially the same.

The portion 14, between *d* and *e*, is commonly, as in this case, separated from the lateral parts; but sometimes, on one or the other side, or on both sides, it is in connexion with the portion marked 18.

Between *e* and *f* is a longitudinal portion, 13, sometimes separated from the lateral convolution marked 21 on the right side, and sometimes connected with it, as on the left side.

Farther, the portions marked 18 18, 4, 5, 11, 12 12 12, and others deeper situated laterally and in the forehead, may be easily pointed out in the ordinary state; and in this way the idea of the regularity of the cerebral portions, as to their essential appearance, may be put at rest.

If it be objected that the difference of their internal organisation cannot be proved by anatomy, I repeat that which I already stated with respect to the parts of the spinal cord, or nerves of sensation and voluntary motion; viz. that their difference, too, cannot be proved by anatomy, but that it is admitted from physiological proofs. The same will be the case with the cerebral portions.

II. *In certain Idiots, individual Portions of the Brain are defective, or even wanting.*

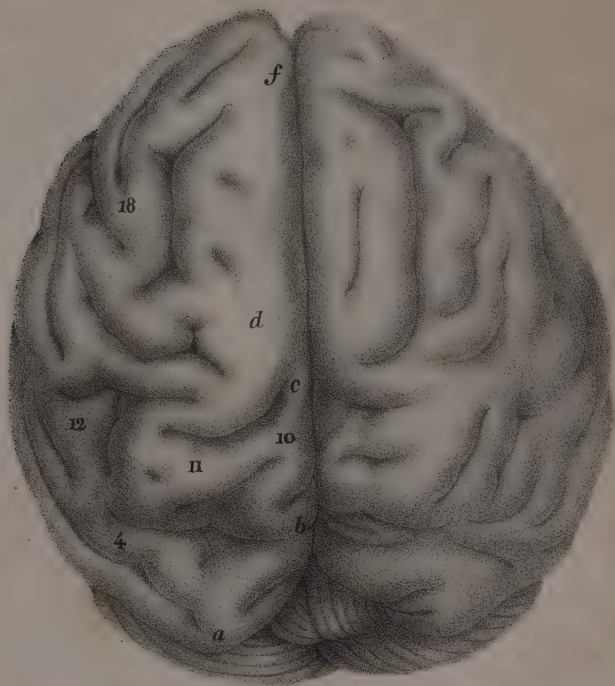
It is evident that a disorder in the internal organisation of the brain and its parts may prevent the manifestations of the mind; but it is also certain that sometimes individual portions of the brain are defective in their development, remain more or less in their embryonic state, or are entirely wanting. Why should this not happen in the cerebral portions, as well as in the nervous apparatuses of the external senses? There are various cases of monsters on record, who were deprived of the olfactory or optic nerve; others are born with imperfect brains. In the *Zeitschrift für Physiologie*, published by Tiedemann and Tre-

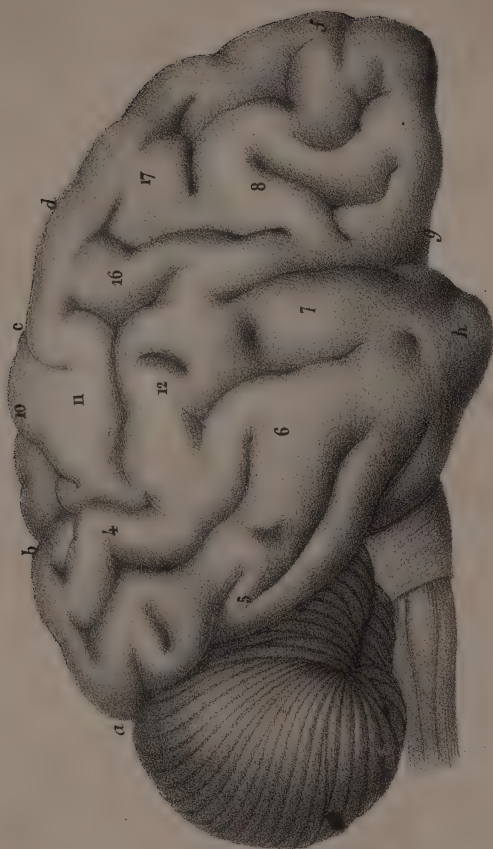
viranus, several defective brains of monsters are described and represented. There is one whose surface is smooth, without convolutions, as in the lower animals and in the embryo of man. In my work on the Anatomy of the Brain, I gave the figure of the brain of an idiotic girl, who died at Cork in Ireland, in comparison with the brain of an ourang-outang, kept in alcohol in the Garden of Plants at Paris. I lay here by the drawings of such a brain in the possession of Mr. Stanley, by whose kindness I was allowed to take them. There is one view from above, another in profile, and a third from the basis. The natural size of the individual parts is copied, but the parts are not in their natural position: the medulla oblongata, the cerebellum and the posterior lobes, in particular, are stretched out horizontally backward, because the brain is taken out of the skull.

Pl. II. presents the upper surface. Being compared with the ordinary state (Pl. I.), the portion between *a* and *b*, and that between *b* and *c*, are evidently defective in their development. The third portion, between *c* and *d*, is still more so. The portions 14, 13, and 21 of the ordinary brain are not distinctly separated from each other, but are mixed together between *d* and *f*. The convolutions marked 10 and 11 are more regular, whilst those marked 4, 12, and 18 are very defective and irregular.

The same brain in a lateral view (Pl. III.) shows a defect in all the lateral parts, but particularly in

Pl. II.





Pl.IV.



the anterior portion of the middle lobe, *h*, and in the whole anterior lobe, between *f* and *g*. The portions 4, 5, 12, 16, 17, are extremely defective, in comparison with the ordinary state; 6, 7, 8, 10, and 11, are more regular.

In the views from the basis (Pl. IV.), the individual masses of the middle lobes are pretty natural; but in the anterior lobes, the most striking difference is observed. The longitudinal anfractuosity, in which commonly the olfactory nerve runs, is scarcely indicated by a very small depression, *i*; the oblique depression, *k*, corresponds to an anfractuosity which, in the ordinary state, divides the lower surface of the anterior lobes into three portions—posterior, internal, and external. The common subdivisions of these three portions are scarcely perceptible, and their embryonic state is evident. The cerebral mass, situated behind the superciliary ridge, is extremely backward in its development, and several convolutions which elevate the forehead of man are wanting.

III. *The Brain of the Ourang-outang does not contain all the Parts of the Human Brain.*

It is often said that the brains of mammiferous animals contain the same parts as those of men; while the truth is, that their brains are more or less complicated, and that even the brain of the ourang-outang—which, among all other brains, has the greatest analogy with the human brain in its

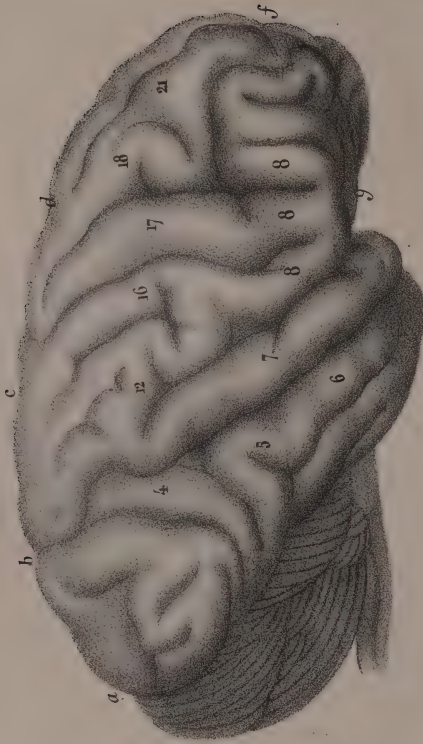
healthy state, and a greater analogy than the brains of many idiots—is yet deprived of several parts. Tyson, who gave a very imperfect figure of the brain of the ourang-outang, was mistaken in finding it quite similar to that of man. M. Tiedemann (*Zeitschrift für Physiologie*, 2 B.) mentions the similarity of the brain of the ourang-outang with that of man as to the cerebellum, medulla oblongata, pons, crura, corpora quadrigemina, optic thalami, corpora striata, corpora candicantia, fornix and its appendices, corpus callosum, anterior and posterior commissures; but he adds, that the brain of the ourang-outang essentially differs from that of man—1st, by its whole mass being smaller, and, 2dly, by its smaller number of convolutions and anfractuositities: yet he had no idea of the special portions being more defective than in man, and of certain parts being wanting altogether.

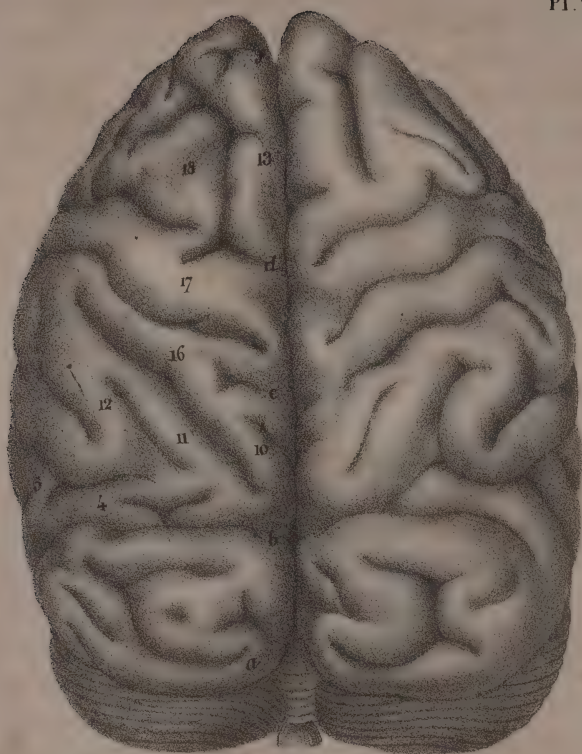
My friend Dr. Leach granted me the permission to make drawings from the brain of an ourang-outang which belongs to him, and is now deposited in the College of Surgeons at London. The three views, from above, in profile, and from the basis, compared with the regular brain of man and with that of the idiot, show at once the analogy, modifications and differences of certain parts, and the entire want of others. The brain being taken out of the skull, its parts changed their natural position, in the same way as the idiotic brain.

PL.VII.



PL. VI.





Pl. V. is the view from above. In comparing it with Pl. I. and with Pl. II., the portions between *a b*, *b c*, and *c d*, are very similar with Pl. I., and more complete than in the idiot, Pl. II. The portion marked 14, between *d* and *e*, Pl. I., is wanting in the ourang-outang; but the next portion, marked 13, Pl. I., between *e* and *f*, is quite similar in man and in the ourang-outang. The parts 4, 5, 10, 11, 12, 16, and 17, correspond to similar parts in man; but about 18 there are several convolutions in man, whilst in the ourang-outang there is only a small cerebral portion, of which it is impossible to say whether it is composed, or not, of different parts.

Pl. VI. exhibits the ourang-outang's brain in profile. There is, again, more analogy with the ordinary state of the human brain than with that of the idiot, Pl. III. The portions *a b*, 4, 5, 6, 7, 8 8 8, 12, 16, and 17, correspond with distinct portions in man. In the anterior lobes between *f g* there is more brain than in the idiot, yet about *f* there is great want of cerebral mass in comparison with the ordinary state of man: 21 seems similar with man, but about 18 again the want of brain is evident.

Pl. VII. represents the brain of the ourang-outang from the basis. The medulla oblongata, cerebellum, pons, crura, vicinal nerves, and the convolutions of the middle lobes, are quite analogous with those of man. The general division, by the anfractuosity *k*, into three portions, posterior, in-

ternal and external, of the basilar part of the anterior lobes, is visible, as in man ; the internal portion is, proportionately to the others, the largest—the posterior and external are small. The cerebral masses behind the superciliary arch are less distinct, and the whole forehead is much smaller than in the ordinary state of man.

The greatest analogy, then, between the brain of man and that of the ourang-outang is in the cerebellum, the middle and posterior lobes, and at the upper surface from behind forward to the two lateral convolutions included. The greatest difference is evident about the portion of the head which corresponds to the fontanel in children, since the portion marked 14 in man (Pl. I.) is entirely wanting ; farther, about the portion, marked 18, under the upper lateral part of the frontal bone, and in the anterior lobes, particularly along the superciliary ridge, and in the upper part of the forehead.

From the preceding anatomical remarks, it follows—1st, that the brain cannot be considered as a unity ;—2dly, that individual rubrics of cerebral portions may be pointed out in man ;—3dly, that these individual portions may be more or less defective, or entirely wanting ;—4thly, that the brain of the ourang-outang, notwithstanding its great analogy with the human brain, is deprived of certain parts, whilst others are less developed than in the ordinary state of man ;—5thly, that

the comparative anatomy of the brain must be conducted in the same way as in every other system of organisation ;—and finally, that a true division of the cerebral masses can be established only by the assistance of Physiology and Pathology. The importance of this object is evident from the delicacy of cerebral organisation, and it is proportionate to the eminent functions attached to it. I therefore hope my remarks will meet the same attention which is commonly bestowed on investigations concerning other parts of our body, or even inanimate beings.

G. SPURZHEIM, M.D.

SOME REMARKS

ON

MR. CHARLES BELL'S ANIMADVERSIONS. ON PHRENOLOGY.

CHARLES BELL, Esq., in a Paper on the Nerves of the Orbit, read before the Royal Society of London, June 19, 1823, printed in the Philosophical Transactions of the Society, vol. cviii. p. 306, attacked Phrenology in expressions which the lover of truth will know how to qualify. I was aware of them long ago, and knew that this mighty Professor had reproduced them in 1824, in an octavo volume; but I had hoped that he had changed his mind, after all which has happened since 1825, in Great Britain and Ireland, with respect to Phrenology. But as he has again published his accusations without any additional note or explanation, in this very year 1830, in a quarto volume entitled "The Nervous System of the Human Body" (p. 222), I wish to bring his high-sounding animosity against scientific importations from foreign countries before the Court of public justice.

"The most extravagant departure," says the learned Professor, "from all the legitimate modes

of reasoning, although still under the colour of anatomical observation, is the system of Dr. Gall. It is sufficient to say, that without comprehending the grand divisions of the nervous system, without a notion of the distinct properties of the individual nerves, or having made any distinction of the columns of the spinal marrow—without even having ascertained the difference of cerebrum or cerebellum,—Gall proceeded to describe the brain as composed of many particular and independent organs, and to assign to each the residence of some special faculty.

“When the popularity of those doctrines is considered,” continues the Professor, “it may easily be conceived how difficult it has been, during their successive importations, to keep my pupils to the examples of our own great countrymen. Surely it is time that the schools of this kingdom should be distinguished from those of other countries. Let us continue to build that structure which has been commenced on the labours of the Monros and Hunters, and which the undeserved popularity of the Continental system has interrupted.”

Professor Bell seems to take his *ipse dixit* as sufficient authority; but *jurare in verba magistri* is no longer the fashion—he is answerable for his assertions, and bound in justice to furnish proofs. Meanwhile, I tax him in the same terms which he applied (4to volume, p. 221) to Bichat: “that he paid too little regard to the opinions that prevailed, often assuming that as a novelty which really was

not, and doing injustice to those who had preceded him."

Professor Bell is unjust towards Bichat, towards Gall, and towards the Continent in general. In my opinion, he beholds the mote that is in his brother's eye, and does not consider the beam that is in his own. If we consider Bichat's education, and his death at the age of thirty-one years, we shall easily excuse his small proficiency in literature; but must admire, at the same time, the juvenile fire of his mind, and the vastness of his conceptions. Had Mr. Charles Bell been carried off from the scene of life at that age, it is probable that his name would never have appeared in the annals of science. Farther, since he himself is obliged to admit that "the best apology for Bichat's conduct was the condition of his country at the time he lived," I ask Professor Bell, whether he can make the same apology for his proceeding. How can he maintain, in 1830, (4to volume, p. 9,) that "nothing more clearly evinced the wrong methods of study prevailing on the Continent, than the acquiescence and approbation with which this system (Bichat's ideas on the ganglions) was received there." Professor Bell must be aware that many anatomists of the Continent are acquainted with the ganglions of nerves which belong to what Bichat styled the animal life. I confine myself to quotations from our publications, since he particularly attacks Gall's doctrine; and our opinions were published long before Pro-

fessor Bell read his animadversions before the Royal Society.

Though Gall and myself considered Bichat as an extraordinary genius, yet, in our work on the Anatomy of the Nervous System in general, and of the Brain in particular (Paris, 1810), we contradicted every one of his opinions with which we thought it fit to find fault. We declared ourselves in particular against the ideas which he entertained on the ganglions.

Since Professor Bell complains of the popularity of our doctrines and of their successive importations, it may be sufficient for the general reader to know what I stated in my English work on the Anatomy of the Brain, p. 22, viz. : that the opinion in regard of the ganglions which Johnstone, Bichat, and Reil entertained, is by no means exact; that the ganglions do not interrupt the reciprocal influence of the brain and the nerves of the spinal cord, and that they appear essential to the structure of the nerves of sensation.

Farther, since our doctrines are so popular in Great Britain—since Professor Bell laments their successive importations, how can he accuse Dr. Gall of not comprehending the grand divisions of the nervous system? Are not divisions and subdivisions of the nervous masses, and the plurality of their functions, the essence of our inquiries from beginning to end? It seems to me that the principle of division and subdivision of the nervous system is as clearly expressed in our works

as Professor Bell is able to do it, and, I may add, with more details than he has done it. In the Preface of our large work on the Anatomy and Physiology of the Nervous System in general, and of the Brain in particular, tome i. p. xxii. (Paris, 1810), we say—"Ce n'est que lorsque l'Anatomie et la Physiologie seront fondues l'une dans l'autre, que la connaissance du système nerveux aura atteint son plus haut degré de perfection." In the Introduction, p. 11, we state—"Il est évident que le système nerveux n'est pas unique et uniforme, mais qu'il doit être divisé suivant les fonctions principales, et que chaque division principale doit être subdivisée suivant les fonctions particulières."

Among the Anatomical Corollaries (sect. ii. p. 75), the tenth states—"Les systèmes nerveux diffèrent entre eux dans leur origine, leur structure, leur couleur, et leur fermeté."

The fifth Section of the above work is entitled "De la Différence des Nerfs," and in p. 128 is the following passage: "Tous les nerfs diffèrent entre eux par la variété de leur configuration. Ainsi les nerfs des sens ne se ressemblent nullement dans leur couleur, leur consistance, leur forme, et leur texture. Souvent les divers filamens du même nerf sont très-visiblement dissemblables. Non seulement les différens systèmes nerveux, mais aussi le filet du même nerf, sortent de différens amas de substance grise placée dans divers endroits... Toutes ces particularités restent les mêmes dans les mêmes nerfs; elles doivent donc avoir

pour cause une différence primitive dans la structure intérieure, et être d'une nécessité essentielle pour la diversité des fonctions."

In our Memoir presented to the French Institute in 1808, and in our large work above mentioned, we make four principal divisions of the nervous system, and treat of them in four separate sections.

In my work, "The Physiognomical System of Drs. Gall and Spurzheim," there is a chapter on the anatomy of the nervous system. In the Second Edition, 1815, p. 13, I say: "We are of opinion that the nervous system must be divided and subdivided, and that each part of these divisions and subdivisions has its peculiar origin." I speak of the common division of the nervous system into four portions.—P. 23: "I admit a difference between the nerves of motion and those of feeling." I treat of anatomical, physiological, and pathological proofs in favour of my opinion. I positively state that "the same nervous fibres do not go to the muscles and to the skin;" and conclude (p. 25) that "the spinal marrow consists of nerves of motion and of feeling, and that the greater number of the pretended cerebral nerves belong to the nerves of motion or of feeling."

In my English work on the Anatomy of the Brain, with a General View of the Nervous System (London, 1826), the second Section, p. 23, is entitled "Division of the Masses composing the Nervous System." I positively state that a true

division of the nervous system can only rest on the nature of the functions performed. In the same Section I separate the nervous masses of vegetative life from those of phrenic life, and admit as many kinds of nerves as different offices of the particular viscera. In the third Section I contend for the difference between the nerves of voluntary motion and sensation, and found my opinion on anatomical, physiological and pathological facts; and (p. 29) I refer the reader for similar ideas to my work "The Physiognomical System," published in 1815, and to my French publication on Phrenology, in 1818. I even state that "in all my Courses of Lectures I have broached similar ideas, and have encouraged those of my auditors whom opportunity favoured to enter on the inquiry, and to endeavour to trace the nervous fibres from their peripheral expansions to their origin in the spinal cord."

These few quotations from our works are an evident refutation of Professor Bell's inexact assertions. It is quite ridiculous to hear him say that Gall had not even ascertained the difference of cerebrum and cerebellum. Dr. Gall, in considering the cerebellum as an organ of a special propensity, could not confound it with the brain proper, or cerebrum; and accordingly, in all our anatomical publications, the cerebellum is treated in a particular chapter.

Thus Mr. Charles Bell's assertions concerning

Gall are incorrect ; but supposing them to be correct, his judgment appears still very weak and inconclusive. Let us suppose, contrary to reality, that Gall and myself had confined ourselves to the brain and its subdivisions : might our observations not be exact, though we were quite ignorant of the rest of the nervous masses ? Professor Bell knows nothing of the brain, neither of its structure nor of its functions ; but can I therefore maintain that his ideas on the nerves of voluntary motion and respiration are erroneous ? He finds it difficult (p. 38) to trace the fifth pair of nerves to the corpus restiforme of the medulla oblongata, which I find easy, and which has been published in our works on the Brain since 1808 ; but am I therefore entitled to say that he does not know the functions of the same nerve ? May not the structure and functions of any part of the body be examined and known, whilst those of other parts are unknown ? Nay, may not the structure or functions of the same part be known individually and separately ? Accordingly, Gall might have discovered the functions of cerebral portions, without attending to the nerves of the spine or the rest of the body ; in the same way as Professor Bell has discovered the functions of some nerves—for instance, of the fifth pair—without knowing their origin, and without attending to the brain.

Professor Bell's self-conceit is evident ; but truth is no prerogative of any country, and the republic of letters and science is acknowledged by all liberal

minds. Since he is opposed to the importation of new doctrines into Great Britain, will he also object to his discoveries being exported to foreign countries? His animosity against Phrenology did not prevent me from mentioning his discoveries in my work on the Anatomy of the Brain.

It is my only object to show Professor Bell's erroneous accusations and envious presumption, otherwise it would be easy to criticise several of his anatomical and physiological propositions. What reason, for instance, has he to reckon the medulla oblongata with the spinal cord? Is it true that "each lateral portion of the spinal marrow contains three tracts or columns, one for voluntary motion, one for sensation, and one for the act of respiration"—(4to volume, p. 23)—and that "a fasciculus may be traced down the spinal marrow, between the sulci, which give rise to the anterior and posterior roots of the spinal nerves"? (Ibid. p. 129.) I flatter myself that the doctrine of Phrenology is founded on more solid demonstrations than Professor Bell's assertions concerning the respiratory column in the spinal marrow. I conclude with Cicero's well-known sentence—"Opinionum commenta delet dies, naturæ judicia confirmat."

G. SPURZHEIM.





